Comparison of key skills specifications 2000/2002 with 2004 standardsX015461July 2004Issue 1

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Mark Scheme (Results)

November 2011

Applications of Mathematics (GCSE)

Unit 2: 5AM2H\_01 (Higher)

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November 2011

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**NOTES ON MARKING PRINCIPLES**

**1** All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

**2** Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

**3** All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate’s response is not worthy of credit according to the mark scheme.

**4** Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

**5** Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

**6** Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*

Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select* *and use a form and style of writing appropriate to purpose and to complex subject matter*

Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.

The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

**7** **With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

**8** **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**9** **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

**10** **Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**11** **Linear equations**

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

**12 Parts of questions**

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

**13 Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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| **Guidance on the use of codes within this mark scheme** |
| M1 – method mark  A1 – accuracy mark  B1 – Working mark  C1 – communication mark  QWC – quality of written communication  oe – or equivalent  cao – correct answer only  ft – follow through  sc – special case  dep – dependent (on a previous mark or conclusion)  indep – independent  isw – ignore subsequent working |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 1 | (a) |  | 4 | 2 | M1 for  oe  A1 cao |
|  | (b) | 30 5 - 4.9 52 | 27.5 | 2 | M1 for 30 × 5 and 4.9 × 52  or 150 and 122.5  A1 cao |
| 2 | (a) | *π* 4.52 | 63.6 | 2 | M1 for *π* × 4.52  A1 for 63.5 – 63.7 |
|  | (b) | 1000 ÷ 4  1000 – 250 = 750  2  3 | 250  300  450 | 4 | M1 for 1000 ÷ 4 or 250 or 750 seen  M1 for (1000 − 250) ÷ (2 + 3) oe or  or  oe or 150 seen  M1 (dep) for ‘150’×2 or ‘150’×3 or ×750 or ×750  A1 for 250, 300 and 450 in correct places  (SC: B2 for 250, 450, 300, i.e. tulips and hyacinths transposed) |
| 3 |  |  | *P* = 9*h* + 60 | 2 | M1 for 9×*h* + *k* (k≠0) or *m* × *h* + 60 (*m* ≠ 9) or 9×*h* + 60  A1 for *P* = 9*h* + 60 condone inclusion of money notation |
| 4 | (a) | 23 50 ÷ 100 | 11.5 | 2 | M1 for 23 × 50 or 1150 seen or 0.23 × 50 or 23 × 0.5  A1 cao |
|  | (b) | 2.4 ÷ 50 100 | 4.8 | 2 | M1 for 2.4 ÷ 50 or 0.048 seen or 240 ÷ 50 or 2.4 ÷ 0.5  A1 cao |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 5 | (a) |  | Correct elevation | 2 | B2 for correct elevation in correct orientation  (B1 for incorrect orientation) |
|  | (b) |  | Correct plan | 2 | B2 for correct plan with internal line shown  (B1 for internal line missing or for rectangle with one incorrect dimension) |
| 6 |  | 1 – (0.008 + 0.015) | 0.977 | 2 | M1 for 1 – (0.008 + 0.015) oe  A1 for 0.977 oe |
| 7 |  |  | Correct region shaded | 3 | B1for perpendicular bisector within guidelines  B1 for arc of circle within guidelines  B1 for correct region shaded or otherwise indicated |
| \*8 |  | = 90 000  90 000 ÷ 1000 = 90  90 ÷ 15 = 6  6 12 =72, 72<100  OR  100 ÷ 6 = 16.66..., 16.66...> 12  OR  100 ÷ 12 = 8.33..., 8.33 > 6 | Yes with full supporting working | 5 | M1 for   or 90 000  M1 for ’90 000’÷1000 or ’90 000’÷15 or 90 or 6000 seen  M1 for ’90’÷15 or ’6000’÷1000 oe  A1 for 6 or 72  C1 for correct decision with appropriate comparison |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 9 |  |  | Point marked | 3 | M1 for line drawn or point marked within guidelines from A  M1 for a line drawn or a point marked within guidelines from B  A1 for a point marked within region where guidelines intersect |
| 10 | (a) | (*x* × *x*− 4) × *x*  *x* × *x* × *x* − 4 × *x* |  | 2 | M1 for showing (*x* × *x*− 4) × *x*  or *x* × *x* × *x* − 4 × *x*  A1 (dep on M1)for simplifying and equating to 80 |
|  | (b) | |  |  |  |  | | --- | --- | --- | --- | | 4 | | 48 | | | 5 | | 105 | | |  | |  | | | 4.5 | | 73.125 | | | 4.6 | | 78.936 | | | 4.7 | | 85.023 | | | 4.8 | | 91.392 | | | 4.9 | | 98.049 | | |  | |  | | | 4.61 | | 79.53218 | | | 4.62 | | 80.13113 | | | 4.63 | | 80.73285 | | | 4.64 | | 81.33734 | | | 4.65 | | 81.94463 | | |  |  | | | 4.6 | 4 | B2 for trial 4.6 ≤ *x* ≤ 4.7 evaluated  (B1 for trial 4 ≤ *x* ≤ 5 evaluated)  B1 for different trial 4.6 ≤ *x* ≤ 4.65 evaluated  B1 (dep on at least one previous B1) for 4.6  Values evaluated can be rounded or truncated, but to nearest whole number when *x* has 1 dp or less and to 1 dp when *x* has 2 dp |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 11 |  | 70 × π = 219.9  1000 ÷ 219.9 = 4.55 | 4 | 4 | M1 for 70 × π or 0.7×π or 219(.9) or 2.1(9)  M1 for using 1000 or ‘70 × π’ ÷ 100 oe  M1 for 1000 ÷ (70 × π) or 10 ÷ (70 × π ÷ 100)  A1 cao |
| 12 |  | ×80 | 31 or 32 | 3 | M1 for  or oe or 0.39    M1 for  oe or 31.2  A1 for 31 or 32 |
| 13 |  | ××350 000×15 | 13125 | 3 | M1 for ××350 000 oe or 875 seen  M1 for ‘875’×15  A1 cao |
| 14 |  | 109 + 73 ≠ 180  or 66 + 112 ≠ 180  180 – 109 ≠ 73  180 –73 ≠ 109  180 – 66 ≠ 112  180 – 112 ≠ 66 | No  with reasoning given | 2 | M1 for finding total of an appropriate pair of angles  A1 for stating total of co-interior angles is not 180  OR  M1 for stating an appropriate pair of alternate angles 71, 107, 114 or 68  A1 for stating that alternate angles are not equal |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 15 |  | 52  − 2.52 = 18.75  = 4.33  OR  5 × cos 30  OR  5 × sin30  OR  × 2 | 4.33 | 4 | B1 for a right-angled triangle shown or 2.5 or 30° or 60° seen.  M1 for 52 − 2.52  M1 for  or  A1 for 4.33 or better  OR  M1 for = cos 30  M1 for 5 × cos 30  A1 for 4.33 or better  OR  M1 for = tan 30  M1 for (*x* =)  A1 for 4.33 or better |
| \*16 |  | = 0.68  = 0.7 | Steven with explanation | 3 | M1 for either probability  or  oe seen  A1 for both converted correctly to a comparable form  C1 for identification of Steven with explanation based on correct comparison, e.g. ‘0.7 > 0.68’ |

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| **5AM2H\_01** | | | | |
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |

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| 17 |  | *P* = *kr*2  36 = *k* × 202  *P* = 0.09 *r*2  OR | *P* = 0.09 *r*2 | 3 | M1 for *P* = *kr*2 (accept any k ≠ 0 or 1)  M1 (dep) for 36 = *k* × 202  A1 for *P* = 0.09 *r*2 oe  OR  M2 for oe, e.g. 202 : *r*2 = 36 : *P*  A1 for oe |

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| 18 |  | = 162.48  cos–1  OR  = 141.42  141.42÷2=70.71  = 154.59  tan–1 | 72.1 | 5 | M1 for or  A1 for 162.4(8)  M1 for cos *y* =  M1 for cos–1  A1 for 72.0 – 72.1  OR  M1 for  or 141.4(2) or or  A1 for 154.5(9)  M1 for tan *y* =  M1 for tan–1  A1 for 72.0 – 72.1 |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 19 |  |  | A  C  D  B | 2 | B2 for 4 correct  (B1 for 2 or 3 correct) |
| 20 | (a) | 15 ÷ 40 | 0.375 | 2 | M1 for oe or sight of right-angled triangle against line  A1 0.375 or 0.38 |
|  | (b) |  | Describes motion | 2 | B1 for constant speed oe for 50 seconds oe  B1 for slows down (to stop) for 30 seconds oe |
|  | (c) | + 50×15 + | 1275 | 2 | M1 for ×15  or correct area for at least one of 3 sections 300, 750 or 225 seen  A1 cao |
|  | (d) |  | 38.25 | 3 | M1 for attempt to find  M1 for ‘1275’ ÷ 1000 or 120 ÷ 3600 oe  A1 for 38 − 38.3 or ft ‘1275’ |
| 21 | (a) | 4 × 62.1 ÷ 10.8 | 23 | 2 | M1 for 4 × 62.1 or 62.1÷ 10.8  A1 cao |
|  | (b) | 1.2 × 62.1 ÷ 18 | 4.14 | 3 | M1 for use of 1.2 or oe or  M1 for 1.2 × 62.1 or 62.1 ÷ 18  A1 for 4.14 |

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| **5AM2H\_01** | | | | |
| **Question** | **Working** | **Answer** | **Mark** | **Notes** |

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| 22 |  | = 1.5  80 × 1.53 | 270 | 3 | M1 for or oe or or oe or 18:12 or 12:18 or 183 : 123 or 123 : 188 oe  M1 for 80 × 1.53 oe  A1 cao  (SC B1 for 120) |
| 23 |  |  | 11 | 3 | M1 for tangent drawn at *t*=2  M1 (dep) for ft from tangent  A1 for 9 – 14 |
| 24 | (i) |  | 400.5 | 4 | B1 for 400.5 accept and 400.499(...) |
|  | (ii) |  | 52.635 |  | B1 cao |
|  | (iii) | 400.5 ÷ 52.635 | 7.609 |  | M1 for ‘400.5’ ÷ ‘52.635’  A1 for 7.60(9...) rounded or truncated |
|  | (b) | 399.5 ÷ 52.645 | 7.589 | 2 | M1 for 399.5 ÷ 52.645  A1 for 7.58(85...) rounded or truncated |
|  | (c) |  | 7.6 | 1 | B1 cao |

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| **5AM2H\_01** | | | | | |
| **Question** | | **Working** | **Answer** | **Mark** | **Notes** |
| 25 |  | Growth factor =  500 ×  ×  = 700  (100+*n*)2 = 14000  100 + *n* = 118.32  *n* = 18.32  After 5 years, 500 × 1.18325  OR  500 ×1.1 1.1 = 605 too low  500 × 1.2 × 1.2 = 720 too big  500 × 1.18 × 1.18 = 696.2 too low  500 × 1.19 × 1.19 = 708.05 too big  500 × 1.183 × 1.183 = 699.745  too low  500 × 1.184 × 1.184 = 700.9  too big  500 × 1.1832 × 1.1832 = 699.98  After 5 years, 500 × 1.18325 | 1159 or 1160 | 5 | M1 for introducing growth factor  M1 for 500 ×  ×  = 700  A1 for 18.32 or 118.32  M1 for 500 × 1.18325  A1 for 1158 or 1159 or 1160 (accept 1143 or 1144)  OR  M1 for any trial evaluated and compared with 700  M1 for trials above and below  A1 for 1.1832 or better  M1 for 500 1.18325  A1 for 1158 or 1159 or 1160 (accept 1143 or 1144)  OR  M1 for introducing a growth factor  M1 for  A1 for (*r*=) oe or 1.18(3)  M1 for oe  A1 for 1158 or 1159 or 1160 (accept 1143 or 1144)  (B2 for 2689 or 2690) |

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